Instruction manual

RAT ROTAROD

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Motor Coordination, Grip Strength, Activity

CROCUS
Scientific Trading

Your Labs,
our devices

Instruction Manual
dated July 2019
Revision 1

SAFETY CONSIDERATIONS

Although this instrument has been designed with Suitable safety standard, this manual contains information, cautions and warnings which must be followed to ensure safe operation and to retain the instrument in safe conditions.

Service and adjustments should be carried out by qualified personnel, authorized by institute.

Any adjustment, maintenance and repair of the opened instrument under voltage should be avoided as much as possible and, when inevitable, should be carried out by a skilled person who isaware of the hazard involved.

Capacitors inside the instrument may still be charged even if the instrument has beendisconnected from its source of supply.

Rat Rota-Rod

General

The Rota-Rod is the reference test to screen drugs potentially active, or having side effects, on motor coordination.

The **Rota-Rod** is an evolution of the original model and the result of many years of research in cooperation with the latest development in behavioral and pharmacological research.

The combines the same functionality of the previous version, now considered the standard, with additional new features: **surprisingly silent operation, much easier experimental organization and data management.**

- NEXT GENERATION ROTA-ROD: SAME RELIABILITY, INNOVATIVE TECHNOLOGY!

Main Features

- **SPEED**: adjustable in the range **3-80 RPM**, in steps of 1 RPM
- **MODE:** constant, ramp (accelerating), multi-step ramp and pause (***NEW! -Optional***)
- **ROTATION:** forward, reverse and rocking (***NEW! -Optional***)
- **DRIVE**: totally silent motor. Zero noise!
- **CONTROLS**: 4”3 touch-screen to set and monitor the test
- ***HMII Display***: brand new, user-friendly version, to set the experiment and manage the results
- **DETECTION:** new design: Trays to enclose the animals, stainless-steel to ease sterilization

Rat Rota-Rod
Model:CST-RR-401

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Rat Rota-Rod

1 GENERAL

The "Rota-Rod" technique has proved to be of great value in research involving screening of drugs which are potentially active on motor co-ordination.

The Rota-Rod is the reference test to screen drugs potentially active, or having side effects, on motor coordination.

The Rota-Rod, is an evolution of the original model and the result of many years of research in cooperation with the latest development in behavioral and pharmacological research.

Principle of Operation

When a rat falls off its cylinder section onto the trip-box below, the plate boxes and the corresponding micro switch is activated, thereby recording the animal endurance time in seconds.

The display shows the actual angular speed (RPM). During the experiment, the display shows for each animal the running time, distance covered, the rotation mode and the rotation speed at the time the animal fell off, combined with information preset by the user.

The record related to each lane can be zeroed during the operation by resetting the related trip plate. This allows the operator to place a fresh rat on a particular rotor lane while the rats on the other lanes are running.

2 INSTRUMENT DESCRIPTION

This version combines the same functionality of the previous version, now considered the standard, with additional new features: surprisingly silent operation, much easier experimental organization and data management.

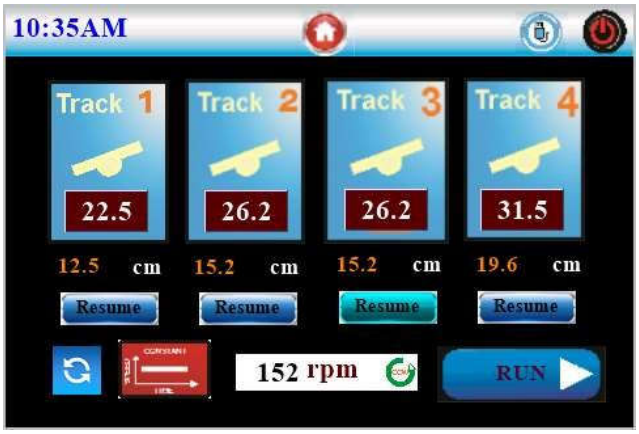
The Rat Rota-Rod consists of **four 6cm diam. cylinders**, which are suitably machined to provide grip. Five **49cm diam. dividers** make for **four lanes**, each **8.7cm wide**, enabling four rats to be on the rotor simultaneously. The **height to fall is 30cm**.

The rotor, whose angular speed can be preset by the operator, turns on ball bearings. It is driven by a silent highly precise stepper motor. Drive speed is unaffected by voltage variations, friction, or wear. This ensures that all trials can be repeated in constant operating conditions. The standard rod rotation is CCW, which can be change even during the experiment.

The incorporates a 4"3 touch-screen, for basic setting and monitoring, via an intuitive panel.

The picture shows the Rota-Rod main menu. By click on Start button. Experiment Running Dashboard will appear in next screen.

Experiment dashboard is shown in this screen. During the test, the touch-screen indicates the actual speed (RPM), time of each slot, distance covered (cm), the status of the rotor section, Operating mode and rod direction.



The test results for each section, can be browsed in a condensed view.

The software, included as standard, provides a user-friendly interface to set the experiment and a powerful tool to manage the results easily on one's PC. Data exchange from the instrument to the PC, tab or mobile is done over **WIFI**.

Notes on Resistive Touch-Screens

If you have in mind the sensitivity to touch of your tablet or smart-phone, you might think the Rota-Rod touch screen does not react promptly, and you have to press down harder.

This is because we employ a resistive touch-screen (while most smart phones use a capacitive screen); the resistive screens are better of our application because of

- High resistance to dust and water
- Better use with gloved hand or stylus (because the conductive technology is dependent on the conductive nature of human body, it doesn't work if the user is wearing gloves).

Rota-Rod Features

The main features of the new model are:

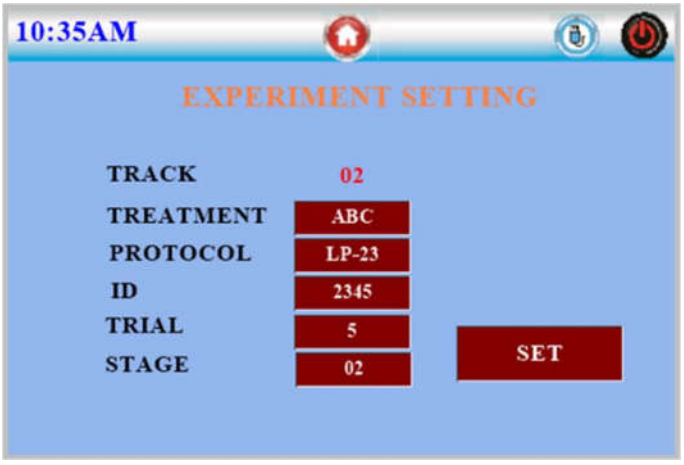
- **SPEED**: adjustable in the range 3-80 RPM, in steps of 1 RPM
- **MODE**: constant, ramp (accelerating), reverse, multi-step ramp (NEW!) (Optional)
- **ROTATION**: forward, reverse and rocking (Optional)
- **DRIVE**: totally silent motor. Zero noise!
- **CONTROLS**: 4"3 touch-screen to set and monitor the test
- **DETECTION**:

  while maintaining the reliable mag- net-contact detection system, the new model introduces new trip- boxes replacing the old trip-plates.

  The boxes confine the animals when they fall off the rod and are made of stainless steel to guaran- tee sturdiness and easy cleaning (they can be autoclaved).

Experimental Configuration

Via the Touch screen from main Manu, the operator can easily organize the experiment for her/his record, and upload it to the PC via WIFI and can print or save the report with specific details.



Treatments, protocols, ID, Trial, stages, animals, and various test features.

Configurations are easily:

- exported to **Pdf** reports
- Print and save to PC and Phone.

3 INSTALLATION

Unpacking & Preliminary Check

Check the contents of the system for completeness, and visually inspect the instrument as soon you take it out of the packaging.

If the instrument is damaged, inform the company immediately, notifying our company. If after having tested it, the instrument fails to meet rated performances, please contact us after sales service.

Notes on the Instruction Manual

The Instruction Manual included in the package (in the booklet) is necessary for the correct installation and operation of the instrument.

We recommend reading the manual with attention, as it is essential for the correct installation and operation of the instrument.

Please save the manual, ready to be consulted by the qualified personnel who use the instrument.

General Safety Instructions

The following guidelines must be followed to ensure safe operation.

- ! **DO NOT** attempt to open or perform any service work
- ! **DO NOT** connect up human subjects

Assembling the Instrument

The Rota-Rod is delivered assembled: position it on a stable and reasonably flat bench or table surface.

Check that the four trip-boxes, under each cylinder section, are correctly positioned.

Before Applying Power

Consider the Power Module, positioned right on the side panel, which encompasses – from right to left - the mains switch and the adapter pin.

Mains Switch

This two-pole toggle switch, which complies with safety standards.

Mains Adapter

It is a standard 12v,5Amp DC supply adapter.

Intended Use

The Rota-Rod is intended for investigation use on **laboratory animals only**.

Additional Safety Consideration

1) Use original accessories and spare parts only.
2) immediately disconnect and replace damaged part.
3) do not obstruct a comfortable access to the power module.
4) do not operate in hazardous environments or outside prescribed environmental limitations (i.e., -5c° / +60c°, 95% max. relative humidity, non-condensing).
5) do not spray any liquid on the connectors and on the geared motor.

Company DOES NOT ACCEPT ANY RESPONSIBILITY FOR PROBLEMS OR HARM CAUSED TO THINGS OR PERSONS, ARISING FROM:

- incorrect electrical supply;
- incorrect installation procedure;
- incorrect or improper use or, in any case, not in accordance with the purpose for which the instrument has been designed and the warnings stated in the instruction manual supplied with the instrument;
- replacement of original components, accessories or parts with others not approved by the manufacturer;
- servicing carried out by unauthorized personnel.

Connections

Connect the mains cord of power adapter to a power outtake, ***provided with a reliable earth connection***.

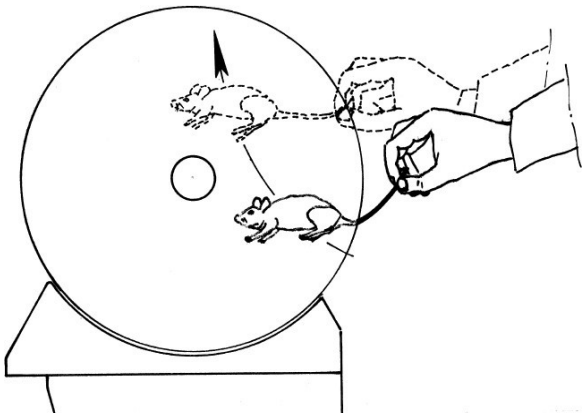
4 PRELIMINARY

Placing the Rats on the Rotor

We recommend that **the rotor is set in motion before placing the rats in position**; or else, by the time the last rat is in place, the first may well be facing the wrong direction and is therefore likely to fall immediately when the drum starts rotating.

Run the rotor at the selected speed and then start the experiment and press all the tray to stop respective times. Then place the rats, one by one, in their respective lanes, at the same time **Resuming the related counter to its time, by Pressing the resume button on HMI.**

Flip them up by the tail, right-side up but dorsal side in first, and then drop them between the rotating discs onto the rotor.



IMPORTANT:

The rats should not be lowered from above; if an attempt is made to place the animal directly on the rotor, it will spread its legs and block entry between the discs.

Experience and patience will teach the ideal technique: as in most behavioral devices, the man/ animal interface is not less important than the animal/ machine one, and requires some patience and gentle handling to be perfected.

Speaking about animal/machine interface, the surface finishing of the drums is a sensitive point. The rotor drums are knurled to provide adequate grip. Soft substances are not suitable, as the rats would cling to the drums without trying to keep pace with the revolving rotor as the experiment dictates; knurled Perspex provides, according to our experience, the ideal compromise, and remains spotless after years of use.

If you have the feeling that the rotor surface is too glossy and smooth, brush its knurled surface with a metallic brush; this action will not make the surface texture course, but it creates thousands of micro scratches which eventually improve the grip.

Training

It advisable to carry out an acclimation and training session, before starting the motor coordination test.

With the rotor at low speed, say 4-5 R.P.M., each naïve rat is placed upon its section in order to familiarize it with the revolving rotor. After 2-3 training runs of 1-2 minutes at intervals of 2-3 hours, the rats should be accustomed to the rotarod, and ready for the test proper.

5 OPERATION

Switch on the Rota-Rod: LCD display will be on in 1-2 seconds. Verify the rotarod surrounding is clear and nothing will be a hurdle in its operation

After switching on the instrument, first of all, get familiar with its controls.

Home Page

The test is managed by the 4”3 touch-screen.

This is how the Home Page looks like.

This window displays current date and time, home page button and WIFI connection and screen-off Icon on upper bar.

 From any other menu, the logo button always brings back to the home page.

5.1.1 Home Page Icons

In the EXPERIMENT page, it is possible to enter information about the test, including treatment, protocol, stage, trial, etc.

A new report can be generated and save by clicking on report icon.

Experiment start menu can be open from start menu

goes to help desc for any support and recommendations

goes to set Time and date

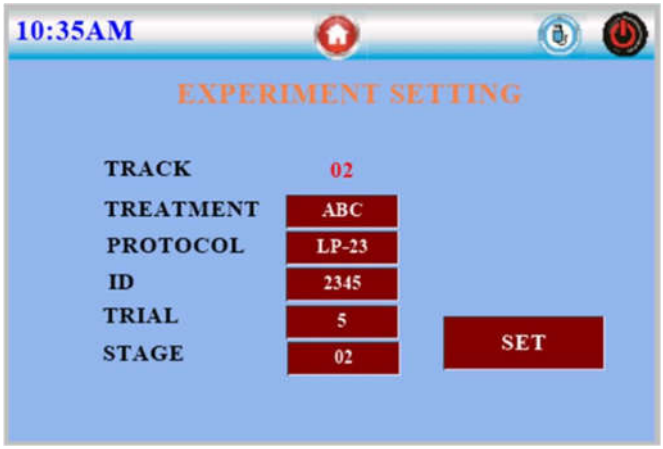
goes to RESULTS Page to open current or previous report

Experiment

In the EXPERIMENT page, it is possible to enter information about the test

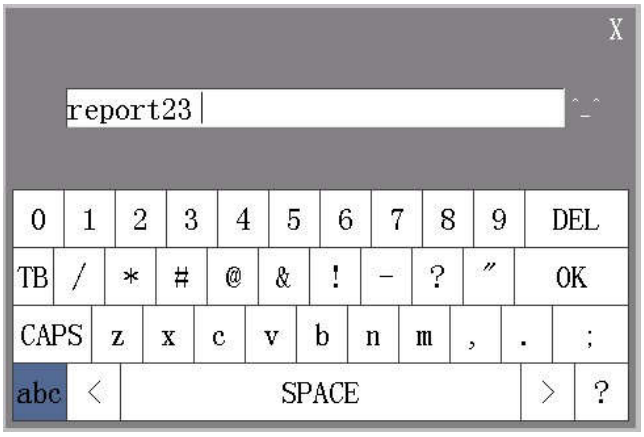
First of all, select the Track number by pressing the track buttons needed to be updated

The selected track appears in the following screen.



Press the respective entity button to activate the virtual keyboard

Key board will be appeared in next screen. Type the data of entity and click ok to edit the data for subjected entity. Enter a maximum of 10 characters in each field. TREATMENT, PROTOCOL, STAGE and TRIAL are text boxes, where it possible to specify the related information.



All the information boxes are independent for each track: select another lane and enter the related data. Repeat the same process for each track. the user may choose not to enter any information and leave the fields empty.

When all the Entities of this Track entered then press the set button.

Previous Experiment screen will appear again to set the data for other tracks in the same way.

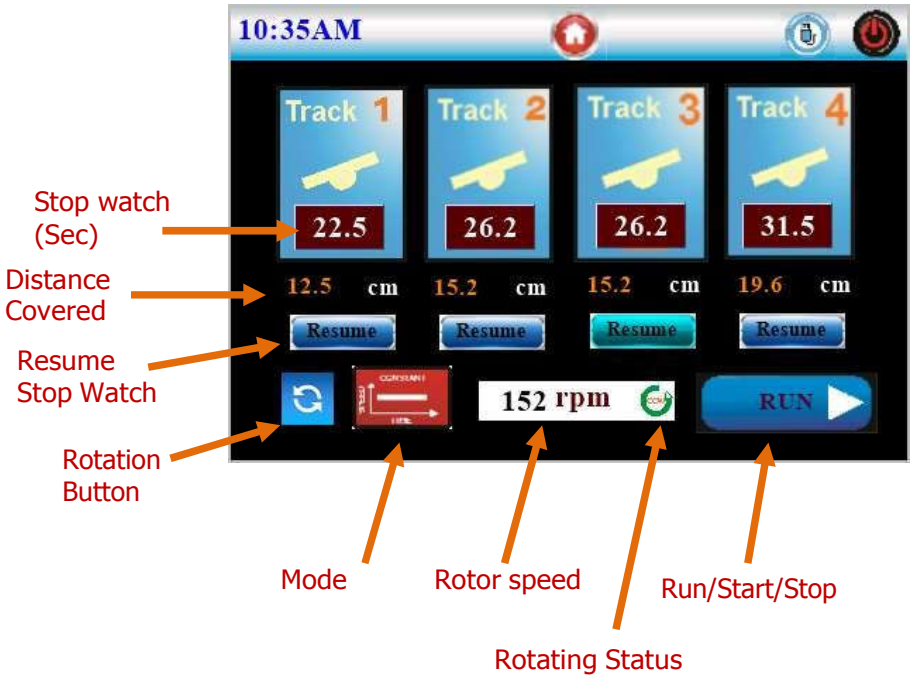
Then press the set button to save all the data of current experiment and return back to main screen.

Or data can be cleared of all tracks by pressing the "CLEAR ALL" button

 The Home Page icon brings back to the home page.

Mode Set-Up

From main menu on pressing the START icon, Experiment screen will appear as shown in figure



In this page, status of each track is shown along it respective stopwatch time and distance covered before fall of animal.

After fall of certain animal, the stopwatch and distance covered of respective track get stop. And Track status will be marked in green color.

if user want to replace the same animal, press the resume button  after placing the animal again on same track.

At bottom left corner user can reverse the rotation direction of rod even during the experiment by pressing the rotation button  .

Current speed of rotating road and running direction of road is shown at center of bottom.

In this page it is possible to set-up **Speed** and **Mode**.

The user may choose among the **CONSTANT**, **RAMP**, **REVERSE RAMP**, **CUSTOM RAMP**, **ROCKING** modes, by pressing the related button at the page bottom.

The next screen of setting the mode and speed will appear as shown in figure below.

Speed of rotor can be set by pressing the speed button. IN Next, numeric Keyboard will be appear. Speed limit to enter is up to 80rpm with step size of 0.1. Confirm Speed by pressing the "SET" button 

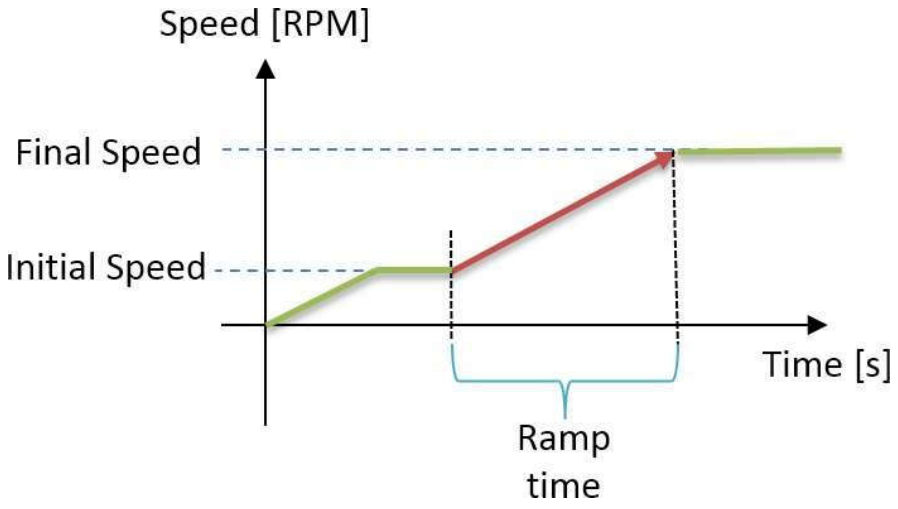
Constant Speed Mode

With **Constant Speed** mode, the rod rotates CCW at a speed which remains constant, for the duration of the test. Press the Speed box to activate the numeric keyboard to enter speed:

- *Constant's speed can be entered by numeric keyboard and press ok to save*
- *If the speed is lower than 80 then speed will be updated. Otherwise, it will set to maximum speed.*

Accelerated/Decelerated Speed (RAMP Mode) (Optional)

This mode allows testing the subjects with an **increasing/decreasing** speed. It is necessary to set the initial and final speed, and the ramp (the time the rotor takes to go from the initial to the final speed). Revolutions are CCW.



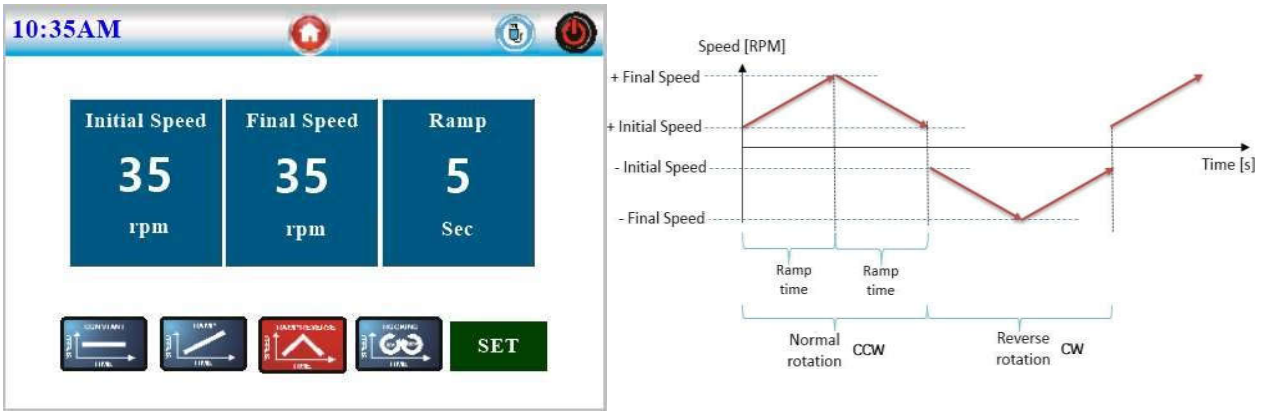
Depress the Txt box to activate the numeric keyboard to enter:

- **Initial speed**: between **3** and **80 RPM**
- **final speed**: between **3 and 80 RPM**
  - *if the initial speed is lower than the final speed, the speed will be accelerating: on the contrary a decelerated speed is obtained by setting an initial speed higher than the final one)*

  ramp: from 1s to 999s (acceleration limits: maximum 2RPM/s)

Reverse Rotation (Optional)

This mode allows testing the subjects with reversing rotation, which means a 4-stage cycle consisting of a CCW-rotation phase at increasing speed, followed by a phase at decreasing speed, a change of rotation, hence a CW-rotation phase at increasing speed, followed by a phase at decreasing speed.



The scheme on the right simplifies the reverse cycle.

- **Initial speed**: between **3 and 80 RPM**
- **final speed**: between **3 and 80 RPM**

  If the initial speed is lower than the final speed, the speed will be accelerating: on the contrary a decelerated speed is obtained by setting an initial speed higher than the final one)
- **ramp**: from 1s to 999s (acceleration limits: maximum 2RPM/s)

Rocking (Optional)

When this mode is selected, the rotor will complete the number of preset revolutions CCW, then reverse rotation and complete the same number of revolutions CW, then repeating the cycle until stopped. number.

In the example: the rotor will revolve repeatedly 5 times forward, then 5 times backward.

- **Speed**: between **3 and 80 RPM** *(In the Rocking mode, the speed is constant!)*
- **Revolution number**

  Can be entered from 1 to 50

Start Button

Starting Constant Speed

In the constant speed mode, during **IDLE** state, the motor and the counters are disabled.

Pressing the **RUN** 

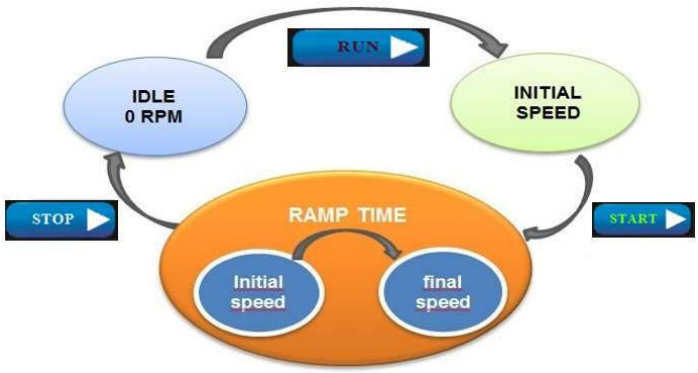
button, starts the motor and then on **START** 

button it enables the counters.

The motor stops and the counters are disabled by pressing the **STOP** 

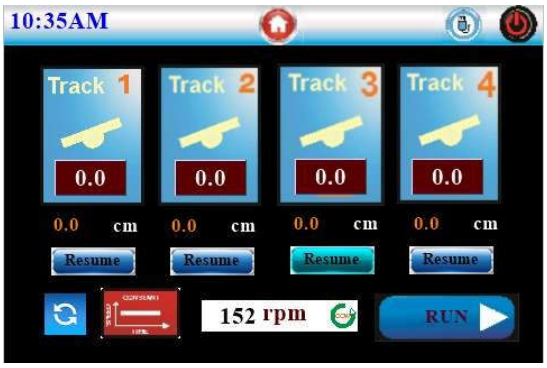
button.

During RUN state, each counter is started by lifting the related trip box.



when an animal falls off its rotor section, tilting the trip box to DOWN position,

the related counter stops and the display shows the lane as green; the data are saved and will appear in the RESULT table.



Starting a Ramp

In the accelerating mode, when the **RUN** button is depressed, the Rota-Rod will pass from the IDLE state (motor and counters disabled), to the **initial speed**.

The experiment and the counters are started by the **START** button: the motor will accelerate from the INITIAL SPEED to the FINAL SPEED.

When an animal falls off its rotor section, tilting the trip box to DOWN position, the related counter stops and the display shows the lane as green, indicating the completed revolutions; the data are saved and will appear in the RESULT table.

As soon as the FINAL SPEED is reached, the rod will keep rotating at constant speed and the timers will continue counting.

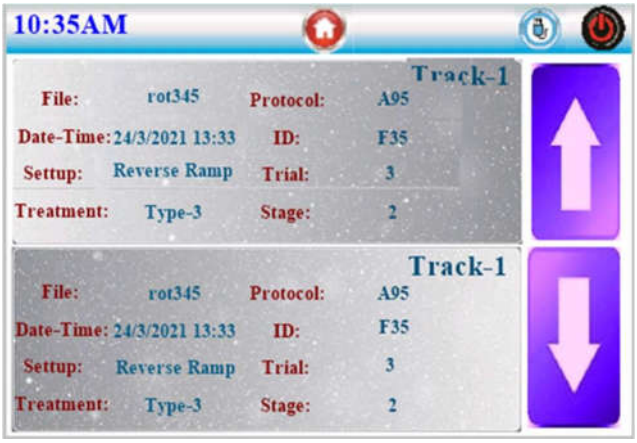
The motor and the counters will stop by pressing the STOP button at any time during the experiment.

Results

Data are saved in the internal memory and they can be scrolled on the touch-screen. Reach the results section by depressing the "RESULTS" icon from the home page.

As you see from the example, all the Experiment-related information entered by the user appear under the blue headings

- **DATE-TIME**
- **SETUP**
- **TREATMENT**
- **ID**
- **PROTOCOL**
- **STAGE**
- **TRIAL**



The test results appear under the red headings:

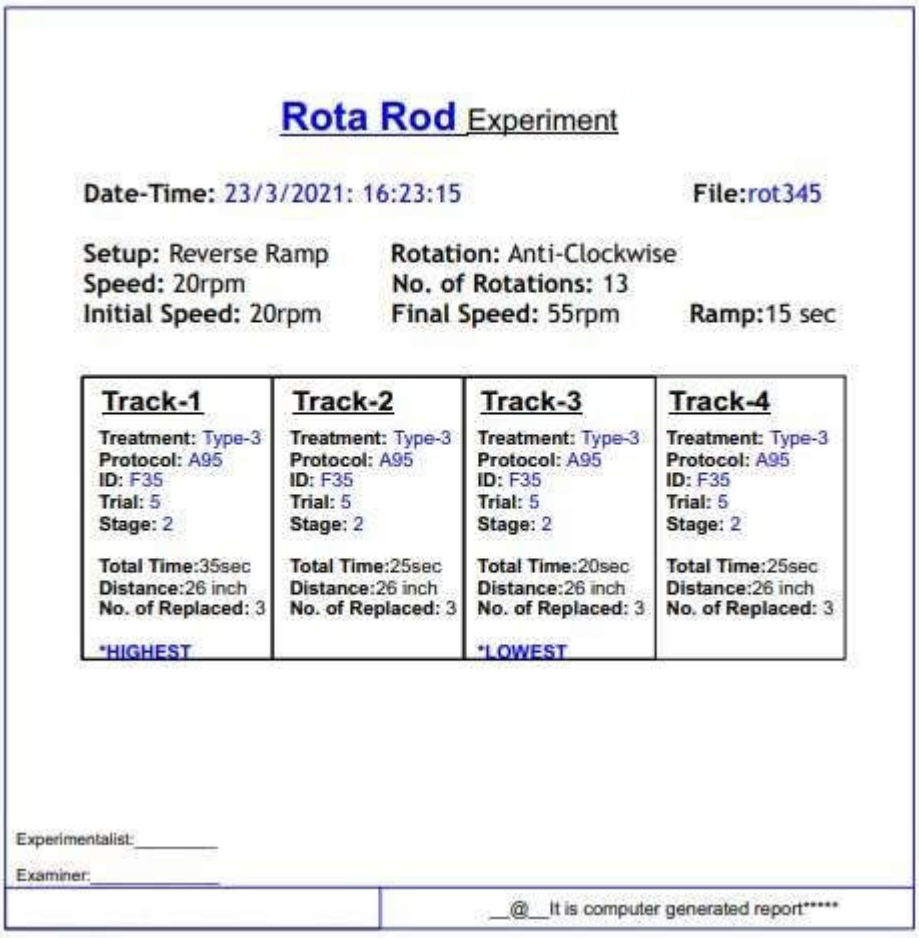
- **Setup**
- **REVOLUTIONS**
- **SPEED**
- **MODE**
- **DISTANCE**

Scroll through the results by the UP ▲ and DOWN ▼ arrows.

Pressing a result will lead to next screen to visualize the whole experiment data

Results can be uploaded on the PC or mobile phone for further processing and printing by depressing the EXPORT button **Export**.

Report will be appearing on browser in the format shown below.



Rota Rod Experiment

Date-Time: 23/3/2021: 16:23:15 **File:**rot345

Setup: Reverse Ramp **Rotation:** Anti-Clockwise
Speed: 20rpm **No. of Rotations:** 13
Initial Speed: 20rpm **Final Speed:** 55rpm **Ramp:**15 sec

Track-1	Track-2	Track-3	Track-4
Treatment: Type-3	**Treatment:** Type-3	**Treatment:** Type-3	**Treatment:** Type-3
Protocol: A95	**Protocol:** A95	**Protocol:** A95	**Protocol:** A95
ID: F35	**ID:** F35	**ID:** F35	**ID:** F35
Trial: 5	**Trial:** 5	**Trial:** 5	**Trial:** 5
Stage: 2	**Stage:** 2	**Stage:** 2	**Stage:** 2
Total Time:35sec	**Total Time:**25sec	**Total Time:**20sec	**Total Time:**25sec
Distance:26 inch	**Distance:**26 inch	**Distance:**26 inch	**Distance:**26 inch
No. of Replaced: 3	**No. of Replaced:** 3	**No. of Replaced:** 3	**No. of Replaced:** 3
*HIGHEST		*LOWEST	

Experimentalist:_____

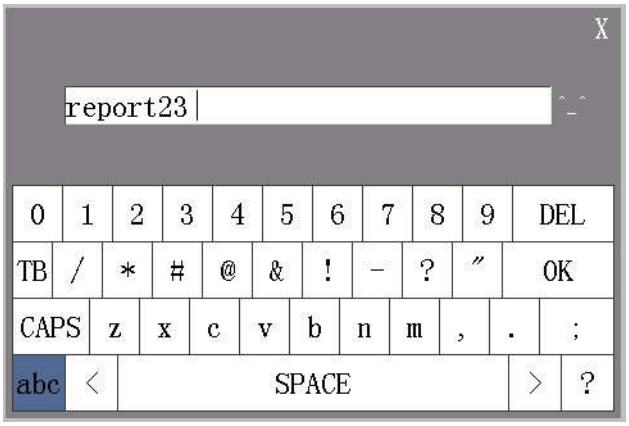
Examiner:_____

__@__It is computer generated report*****

Save Results:

Current Experiment data can be saved by pressing the icon from main menu, following screen will appear.

By pressing the filename tab. Qwerty Keyboard will appear.



Type file name and press **OK** to enter the data. Now click the save 

button. Whole data will be saved in memory with the name of file.

Setting Date & Time

Select the "**DATE TIME**" icon

Set date and time by using the UP ▲ and
DOWN ▼ arrows, then confirm by pressing **OK** button.

MAINTENANCE

While any service of the instrument ought to be carried out by qualified personnel authorized by manufacturer, this manual section describes normal maintenance procedures which can be carried out at your facility.

UNPLUG THE MAINS CORD BEFORE CARRYING OUT ANY MAINTENANCE JOB!

Electrical

To inspect **disconnect the mains cable first!** Open side cover on right side by a miniature screwdriver all connection of I/O's are connected on mother board.

Cleaning

Rota-Rod does not require any maintenance apart from normal cleaning.

Do not use organic solutions, liable to impair the discs and the acrylic components and touch-pad.

Cotton wool and water can be used for cleaning purposes. For disinfection, use a non-alcoholic disinfectant, or H2O2.

Long Inactivity

The instrument does not require any particular maintenance after long inactivity, except cleaning.

Customer Support

For any further information you may desire concerning the use and/or maintenance of the Rota-Rod, please do not hesitate to contact our **service department** (or our local distributor) either directly or via our support page www crocusscientific.com :

Information can be obtain by depressing the icon  from main menu.

Before sending any instrument to our factory for repair, please contact our logistics department to obtain a return authorization number (RMA) and shipping/packing instructions.

We may not be held responsible for damages during transport due to poor packing; whenever possible, please use the original packing.

SPECIFICATIONS

General	
Model	CST-RR-401
Commands	4"3 touch-screen (resistive)
Read-out	on the touch-screen
Power Requirement	Universal input 85-264 VAC, 50Hz, for 12v DC Power supply.
Sound Level	< 60 dB (A)
Operating Temperature	-5° to 60° C
Operation	
Speed	adjustable in the range 3-80 RPM, in steps of 1 RPM
Basic Mode	constant,
Optional on Demand	ramp (accelerating), multi-step ramp (NEW!), forward, reverse, rocking
Rotor Start/Stop	on the touch-screen
Counting Start /Stop	each section via its trip box
Trip-Box	PVC
Drive	forward, reverse, rocking
Data Portability	WIFI
Data	exported to Pdf
Physical	
Total Weight	15Kg approx..
Shipping Weight	21Kg approx.
Dimensions	55(w)x46(d)x57(h)cm
Packing Dimensions	76x60x75cm
Warranty	12-month